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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/006,477	11/30/2001	Mark J. Kilgard	NVIDP069/P0000051	3608

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EXAMINER

QUILLEN, ALLEN E

ART UNIT	PAPER NUMBER
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2676

DATE MAILED: 11/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/006,477

Applicant(s)

KILGARD ET AL.

Examiner

Allen E. Quillen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 September 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-8 and 11-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-8 and 11-26 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

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DETAILED ACTION

Response to Amendment

1. Claims 2-3 and 9-10 are cancelled. Claims 1, 4-5, 8, 11-12, 15-20, 22-24 amended. Added new Claims 25-26. Claims 1, 4-8, 11-26 pending. Applicant's arguments with respect to claims 1, 4-8, 11-26 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

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evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1, 4-8, 11-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson, U.S. Patent 6,469,704, and Deering, Michael F., and Nelson, Scott R., Leo: A System for Cost Effective 3D Shaded Graphics, Proceedings of the 20th Annual Conference on Computer Graphics and Interactive Techniques, ACM Press, NY, NY, September, 1993, pp. 101-108, in view of Fowler, et al, U.S. Patent Application Publication US 2002/0180741.

4. Regarding claim 1, representative of claims 8, 15-17, 24-26, Johnson discloses a method for buffering data (Column 15, lines 1-60) produced by a computer graphics pipeline (Column 8, line 13; Column 25, lines 23-31), comprising: producing graphics floating point data (Column 8, line 5) in a graphics pipeline; operating on the graphics floating point data in the graphics pipeline (Figures 1, 3, Column 7-8) ; and storing the graphics floating point data to a buffer (Figures 5A-5C, 7A-7C, elements 530, 736; Column 15, line 61 through Column 16, line 67).

Johnson does not disclose wherein the graphics floating point data is read and stored in an unclamped format for increasing a parameter selected from the group consisting of a precision and a range of the graphics floating point data. Deering teaches wherein the graphics floating point data is read and stored in an unclamped format for increasing a parameter selected from the group consisting of a precision and a range of the graphics floating point data (*floating point*

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processing, Page 103, left column, lines 10-14; and fourth paragraph, *format conversion*, line 7-8; *32-bit IEEE floating point, 8-bit, 16-bit, 32-bit or 64-bit*, right column, first paragraph; *compressed from 32-bit...eventually end up as 8-bit values in the frame buffer*, Page 104, left column, third paragraph). The motivation for combining floating point operations with multiple precision operations is for improved data transfer bandwidth, parallel execution, load balancing of complex mathematical operations involving texturing [shading] operations (Page 102, left column, lines 1-6; right column, lines 2, 4-7; Page 103, left column, second paragraph, lines 1-3; Page 104, right column, third paragraph from the bottom of the page). Deering is evidence that at the time of the invention, it would have been obvious to one skilled in the art of programmable graphical applications using floating point data [OpenGL and Leo] to combine the benefits of buffering data in a pipelined operation, as Johnson discloses, with floating point precision formats, as Deering teaches, to improve data processing in a parallel-pipelined system (Figure 1).

Johnson discloses a graphics application program interface (Column 11, lines 30-55) from a rasterizer in a format dictated by [API] (Column 13, lines 53-62). Johnson does not disclose wherein the graphics data includes fragment data received from a rasterizer in a format dictated by [API]. Fowler teaches wherein the graphics data includes fragment data received from a rasterizer in a format dictated by a graphics application program interface [API] (Page 2, Paragraphs 29-30, 39). The motivation for combining floating point operations with fragment data received from a rasterizer in a format dictated by an API is to enhance the appearance of rendered images using larger and more detailed texture image, and texture operations using delays caused by decompression and associated memory latencies (Page 2, paragraphs 29, 30, 38). Fowler is evidence that at the time of the invention, it would have been obvious to one

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skilled in graphics display processing to combine the benefits of floating point operations, as Johnson discloses, with an API rasterized fragment texture map buffers, as Fowler teaches, to improve memory operations and display image appearance.

[further Claim 24, 25-26] Johnson discloses determining whether the graphics pipeline is operating in a programmable mode utilizing a command associated with a graphics application program interface [*API, OpenGL, glNewList()*command, a graphics application program interface operating in programmable, immediate-to-display list] mode (Column 11, lines 30-55; Column 12, lines 36-49); if it is determined that the graphics pipeline is not operating in the programmable mode, performing standard graphics application program interface operations on the graphics data (Column 12, lines 15-49); and if it is determined that the graphics pipeline is operating in the programmable [immediate] mode (see above).

Johnson discloses storing data to a frame buffer (Column 7, line 67) but does not disclose storing the graphics data to a frame buffer and if it is determined that the graphics pipeline is operating in the programmable [immediate] mode. Fowler teaches storing to a frame buffer (Figure 6, Page 2, Paragraphs 29-30). The motivation for combining floating point operations with storing data in a frame buffer while in programmable mode is to enhance the appearance of rendered images using larger and more detailed texture image, and texture operations using delays caused by decompression and associated memory latencies (Page 2, paragraphs 29, 30, 38). Fowler is evidence that at the time of the invention, it would have been obvious to one skilled in graphics display processing to combine the benefits of floating point programmable operations, as Johnson discloses, with a frame buffer, as Fowler teaches, to improve memory operations and display image appearance.

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5. Regarding claim 4, representative of claim 11, Johnson discloses a method as recited in claim 1, wherein the fragment data includes color data (Column 7, lines 25-33, R,G,B, alpha, lines 30-31).

6. Regarding claim 5, representative of claim 12, Johnson discloses a method as recited in claim 1, wherein the fragment data includes depth data (*Z values*, Column 7, line 44).

7. Regarding claim 6, representative of claim 13, Johnson discloses a method as recited in claim 1, wherein the graphics floating point data (see above).

Johnson does not disclose is only constrained by an underlying data type. Deering teaches is only constrained by an underlying data type (*floating point processing*, Page 103, left column, lines 10-14; and fourth paragraph, *format conversion*, line 7-8; *32-bit IEEE floating point, 8-bit, 16-bit, 32-bit or 64-bit*, right column, first paragraph; *compressed from 32-bit...eventually end up as 8-bit values in the frame buffer*, Page 104, left column, third paragraph). The motivation for combining floating point operations with multiple precision operations is for improved data transfer bandwidth, parallel execution, load balancing of complex mathematical operations involving texturing [shading] operations (Page 102, left column, lines 1-6; right column, lines 2, 4-7; Page 103, left column, second paragraph, lines 1-3; Page 104, right column, third paragraph from the bottom of the page). Deering is evidence that at the time of the invention, it would have been obvious to one skilled in the art of programmable

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graphical applications using floating point data [OpenGL and Leo] to combine the benefits of buffering data in a pipelined operation, as Johnson discloses, with floating point precision formats, as Deering teaches, to improve data processing in a parallel-pipelined system (Figure 1).

8. Regarding claim 7, representative of claims 14, 18, 19, Johnson discloses a method as recited in claim 1, wherein the buffer. Johnson does not disclose the buffer serves as a texture map. Deering teaches disclose the buffer serves as a texture map (RAM chips; Page 102, Figure 2, right column, lines 4-10; left column, second paragraph, lines 2-4; Page 104, left column, third paragraph, lines 1-12; right column fifth paragraph, lines 5-7). The motivation for combining a buffer with a texture map is overcome bandwidth constraints in complex, floating point-intensive graphics display processing (Page 102, left column, lines 1-6; right column, lines 2, 4-7; Page 103, left column, second paragraph, lines 1-3; Page 104, right column, third paragraph from the bottom of the page). Deering is evidence that at the time of the invention, it would have been obvious to one skilled in the art of programmable graphical applications using floating point data to combine the benefits of buffering data in a pipelined operation, as Johnson discloses, with floating point precision formats using the buffer as a texture map, as Deering teaches, to improve data processing in a parallel-pipelined system (Figure 1).

9. Regarding claim 20, Johnson discloses a method of buffering data during multi-pass rendering, comprising: (a) operating on graphics floating point data during a rendering pass in a graphics pipeline; (b) reading the graphics floating point data from a buffer during the rendering pass in the graphics pipeline; (c) storing the graphics floating point data to the buffer during the

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rendering pass in the graphics pipeline; and (d) repeating (a) – (c) during additional rendering passes (Figure 9, *loop, display list mode; redrawn multiple times, vertex accumulator; coalescing*, Column 7, line 22 through Column 8, line 18; Column 11, lines 30-55; Column 13, lines 1-38) utilizing results of a previous rendering pass (*coalescing primitive data sets*, Figures 5B, element 520, Column 15, line 60 through Column 16 line 67) .

10. Regarding claim 21, Johnson discloses a method as recited in claim 20, wherein the operating includes deferred shading (*DeferredType*, Column 17, lines 1-20).

11. Regarding claim 22, representative of claim 23, Johnson discloses a method for buffering data produced by a computer graphics pipeline, comprising: producing graphics floating point data in a graphics pipeline; packing/unpacking graphics floating point data in a graphics pipeline; storing/operating on the unpacked graphics floating point data to a buffer (see above, *States, pixel-packing conventions*, Column 11, lines 16-22).

Johnson does not disclose wherein the packing/unpacking facilitates storage of at least two quantities in a single buffer in a single pass. Fowler teaches wherein the packing/unpacking facilitates storage of at least two quantities in a single buffer in a single pass (Figure 6, Page 2, paragraphs 29-30; Figure 10, Page 3, Paragraph 46). The motivation for combining floating point operations with compression/decompression to a buffer in a single buffer in a single pass is to enhance the appearance of rendered images using larger and more detailed texture image, and texture operations using delays caused by decompression and associated memory latencies (Page 2, paragraphs 29, 30, 38). Fowler is evidence that at the time of the invention, it would have

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been obvious to one skilled in graphics display processing to combine the benefits of floating point programmable operations, as Johnson discloses, with compression/decompression to a buffer in a single buffer in a single pass, as Fowler teaches, to improve memory operations and display image appearance.

Response to Arguments

12. Applicant asserts, "...nowhere in the cited excerpts is there any mention of any sort of fragment data, let alone 'fragment data received from a rasterizer' (Page 8, 2d paragraph, lines 6-7)."

Examiner respectfully replies that (1) Applicant's discloses that OpenGL provides support for (and mandates) per-fragment operations (Page 1, line 15-21), (2) Johnson discloses *OpenGL, portions of the primitives, rendering* (Column 1, line 31 through Column 2, line 67; Column 7, line 33 through Column 9, line 15), (3) Furthermore, Fowler teaches congruity of these features (Page 2, Paragraphs 29-31, 39).

13. Applicant states "...Johnson-Deering combination would fail to meet applicant's specifically claimed 'graphics floating-point data [which] includes fragment data received from a rasterizer that is...stored in an unclamped format.' (Page 8, 3rd paragraph, lines 4-7)."

"...unclamped format in association with a graphics application program interface [API]...(Page 9, 2d Paragraph, lines 5-6; 3rd Paragraph, lines 3-5); "floating point buffer...as a texture map...using extension of an API" (Page 9, paragraph 4 through Page 10, paragraph 4, lines 4)

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Examiner respectfully answers that Johnson discloses API, pixel-packing (Column 11, line 20), rendering (Column 11, line 31-33; Column 15, lines 4-15), texture mapping (Column 7, lines 34-54). Deering teaches wherein the graphics floating point data is read and stored in an unclamped format for increasing a parameter selected from the group consisting of a precision and a range of the graphics floating point data (*floating point processing*, Page 103, left column, lines 10-14; and fourth paragraph, *format conversion*, line 7-8; *32-bit IEEE floating point, 8-bit, 16-bit, 32-bit or 64-bit*, right column, first paragraph; *compressed from 32-bit...eventually end up as 8-bit values in the frame buffer*, Page 104, left column, third paragraph) in pixel pipeline processor. Furthermore, Fowler teaches texture map, buffers, frame buffer, compression/decompression within a pixel pipeline operation using API (Page 2, Paragraph 29) and is now included as prior art.

14. Applicant now claims (22 and 23 amendments) packing/unpacking facilitates storage of at least two quantities in a single buffer in a single pass and requests relevant prior art (Page 10, Paragraph 5, lines 5-7).

Examiner respectfully notes that Fowler teaches packing/unpacking facilitates storage of at least two quantities in a single buffer in a single pass (Figure 6, Page 2, paragraphs 29-30; Figure 10, Page 3, Paragraph 46).

Conclusion

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Applicant's amendments necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen E. Quillen whose telephone number is (703) 605-4584. The examiner can normally be reached on Tuesday – Friday, 8:30am – noon and 1:00 - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew C. Bella, can be reached on (703) 308-6829.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

Or FAX'd to:

(703) 872-9314 (for Technology Center 2600 only)

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Hand delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Sixth Floor (Receptionist), Arlington, Virginia

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number (703) 305-9600 or (703) 305-3800.

Allen E. Quillen
Patent Examiner
Art Unit 2676

November 20, 2003



MATTHEW C. BELLA
SUPERVISORY PATENT EXAMINER
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